

FAX/DATA MODEM USER'S MANUAL

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i - FCC/DOC REQUIREMENTS

i.1 FCC General Information

The Federal Communications Commission (FCC) of the United States restricts specific uses of modems, and places registration responsibilities on both the manufacturer and the individual user:

1. The modem may not be connected to a party line or to a coin operated telephone.
2. The modem manufacturer must make any repairs to the modem to maintain valid FCC registration.
3. Notification to the telephone company is no longer required prior to connecting registered equipment, but upon request from the telephone company, the user shall tell the telephone company which line the equipment is connected to as well as the registration number and ringer equivalence number of the registered protective circuitry. FCC information is printed on a label on the bottom of the modem.

i.2 FCC Notice

This equipment has been tested and found to comply with the limits for a digital device, pursuant to Subpart B of Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and uses radio frequency energy and if not installed and used the instructions, may cause interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Shielded interconnect cables and a shielded power cord must be employed with this equipment to insure compliance with the pertinent RF emission limits governing this device. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

NOTE : The manufacturer is not responsible for any radio or T.V. interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

i.3 DOC Notice

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage or the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100.

Locate an analog telephone line. Many offices have digital telephone lines, which will not work with a modem.

Warning: Do not connect your modem to a digital telephone line. Modems are designed for use only with analog telephone lines; connecting to a digital telephone line may damage the modem. Verify that the line is analog before connecting.

Fax machines use analog telephone lines. If you can't find an analog voice line, find a fax machine and use its line.

1 - INTRODUCTION

Congratulations on your purchase of this outstanding Fax/Data Modem. This manual describes how to operate your new Fax/Data Modem.

Instructions for installing your Fax/Data Modem will be found in the Installation Manual, while the information in this manual, deals exclusively with the operation of the modem *after it is installed*, such as the command set, the internal configuration registers, troubleshooting and testing.

Features :

These Fax/Data Modems combine the features of a 56000/33600/31200/28800 bps data modem and a 14400/9600 bps FAX modem. Your new Fax/Data Modem gives your personal computer the ability to send and receive FAX messages over the telephone line like a standard FAX machine. Your Fax/Data Modem also allows your PC to communicate with other personal computers, terminals or BBS's (Bulletin Board Systems) through the data modem functions.

When used as a data modem your Fax/Data Modem uses the standard AT command set and is fully compatible with K56 Flex/V.90, ITU-T V.42, V.42bis, V.34 ANNEX 12, V.34, V.32bis, V.32, V.22bis, V.23, V.22, V.21, MNP 2-5, Bell 103, 212A and AT&T V.32terbo. When used as a Fax/Data Modem it communicates with all ITU-T Group 3 FAX machines and is compatible with ITU-T V.27ter and V.29, V.17, T.4 and T.30. Switching between DATA mode operation and FAX mode operation of your Fax/Data Modem is done through its firmware, no hardware settings are required.

If you are already familiar with the use of a modem and the Hayes AT command set, this modem will be extremely easy for you to use. Just read the installation procedures in the installation manual and you are ready to begin operation. If you are new to modem communications, we recommend that you read through this manual first. If you come across terms that you don't understand, consult the glossary. Words in **boldface type** are command names, commands, or default settings. Carriage returns (Enter) are noted with <CR> or [ENTER]; this does not mean to enter these characters literally; but instead to press the **Enter** key.

If you are going to call a FAX machine then you must use the Fax software. If the machine that you are going to communicate with is a modem then you must use a data modem communications software.

This manual is written to be used for several models of Fax/Data Modems. Some of the information in this manual may not apply to your fax/data modem.

2 - COMMAND REFERENCE

This chapter provides an alphabetized reference with examples for all commands for the modem. The system of commands is depicted below in Figure 2 - 1.

To use these commands for dialing or configuring the modem, make sure the communications software package you will be using lets you operate the modem through its internal commands. If your software permits use of the modem's internal commands, read this chapter. If not, read your software user's manual and ignore the rest of this manual.

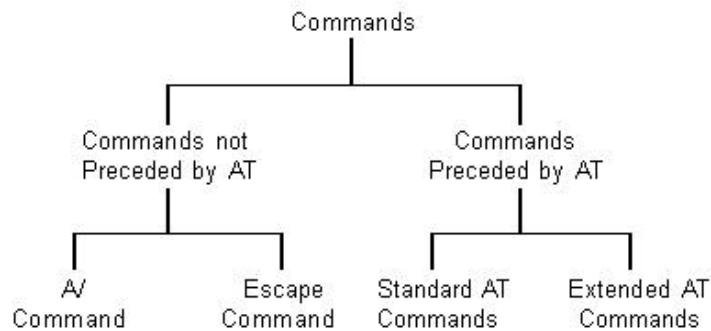


Fig.2-1 System of Commands

2.1 General Command Information

Except for the **A/** command and the + + + escape command described in Section 2.3, all commands must be prefixed with the attention code **AT**. For instance, the **A** command (below) would be entered as: "**AT A <CR>**". Without the **AT** prefix, the command line cannot be executed. Once entered, **AT** cannot be deleted with the **Backspace** or **Delete** keys.

More than one command can be placed on a single line and, if desired, separated with spaces for readability. Once the carriage return (**Enter**) key is pressed, the command line is executed. A line with no carriage return is ignored.

The modem accepts either upper or lower case characters in the command line and ignores any spaces within or between commands. Typing errors can be corrected with the **Backspace** key. Exceptions are noted in the description of specific commands.

Variables (*r* and *x*) are listed in italics. Punctuation symbols (, ; ! @) use as dial modifiers are listed alphabetically according to their English names at the **Dn** command. Where two commands are separated by a slash, either command will have the same effect. For example, if the command is listed as **B0/B**, issuing either **B0** or **B** will have the same effect.

2.2 AT Commands

A **Go On-line in Answer Mode**

This command instructs the modem to go off-hook immediately and then make a handshake with the remote modem. Handshaking is not available during leased line operation.

A is usually used to manually answer an incoming call.

Bn **Communication Standard Setting**

This command determines ITU-T vs. Bell standard.

B0 Selects ITU-T V.22 mode when the modem is at 1200 bits/s.

- B1** **Selects Bell 212A when the modem is at 1200 bits/s. (default)**
- B2** Unselects V.23 reverse channel (same as B3).
- B3** Unselects V.23 reverse channel (same as B2).
- B15** Selects V.21 when the modem is at 300 bits/s.
- B16** **Selects Bell 103J when the modem is at 300 bits/s. (default)**

Cn Carrier Control Option(dummy command)

This command is used by some modems to control the transmit carrier. This modem does not support C0 and will respond in error if this command is given. This modem will accept C1 without error in order to ensure backward compatibility with communications software that issues this command.

- C0** Transmit carrier always off (returns ERROR).
- C1** **Normal transmit carrier switching. (default)**

Dn Dial

This command instructs the modem to begin the dialing sequence. The dial string (n, including modifiers and the telephone number) is entered after ATD command.

A dial string can be up to 40 characters long. Any digit or symbol (0-9, *, #, A, B, C, D) may be dialed as touchtone digits. Characters such as spaces, hyphens, and parentheses do not count - they are ignored by the modem and may be included in the dial string to enhance readability.

The following may be used as dial string modifiers:

- L** Redials last number. Should be the first character following ATD, ignored otherwise.
- P** Pulse dial.
- T** **Touch-tone dialing. (default)**
- ,** Pause during dialing. Pause for time specified in Register S8 before processing the next character in the dial string.
- W** Wait for dial tone. Modem waits for a second dial tone before processing the dial string.
- V** The modem switches to speakerphone and dials the number. An ATH command may be used to disconnect the voice call.
- @** Wait for quiet answer. Wait for five seconds of silence after dialing the number. If silence is not detected, the modem sends a NO ANSWER result code back to the user.
- !** Hook flash. Causes the modem to go on-hook for 0.5 seconds and then return to off-hook.
- ;** Return to command mode. Causes the modem to return to command mode after dialing the number, without disconnecting the call.
- ^** Disable data calling tone transmission.
- S=n** Dial a telephone number previously stored using the &Zn=x command (see the &Zn=x command for further information). The range on n is 0-3.
- \$** Bong tone detection.

En AT Command Echo Options

This command determines whether characters are echoed to the DTE from the modem when it is in command state.

- E0** Echo disabled.
- E1** **Echo enabled. (default)**

Fn On-Line Echo Command(dummy command)

This command is used by some modems to determine whether characters are echoed to the DTE from the modem when it is in the on-line state. This modem does not support F0 and will respond in error if this command is given. This modem will accept F1 without error in order to ensure backward compatibility with communications software that issues this command.

- F0** Returns ERROR.
- F1** **On-line echo disabled. (default)**

Hn Switchhook Control

This command provides control over the line relay.

- H0** Modem goes on-hook.
- H1** **Modem goes off-hook, but will not train. (default)**

In Request ID Information

This command displays specific product information about the modem.

- I0** Returns default speed and controller firmware version. (same as I3)
- I1** Calculates ROM checksum and displays it on the DTE (e.g., 12AB).
- I2** Performs a ROM check and calculates and verifies the checksum displaying OK or ERROR.
- I3** Returns the default speed and the controller firmware version. (same as I0)
- I4** Returns firmware version for data pump (e.g., 94).
- I5** Returns the board ID: software version, hardware version, and country ID.
- I9** Returns country code (e.g., NA Ver. 1).

Ln Speaker Volume

This command determines the volume level of the speaker, when supported by the modem.

- L0** Lowest speaker volume.
- L1** Low speaker volume.

L2 **Medium speaker volume. (default)**

L3 High speaker volume.

Mn Speaker Control

This command determines whether the speaker function of the modem is on or off.

M0 Speaker always off.

M1 **Speaker on until carrier present. (default)**

M2 Speaker always on.

M3 Speaker off during dialing and on until carrier.

Nn Select Negotiate Handshake

This command controls automode enable/disable.

N0 When originating or answering, handshake only at the communication rate specified by **S** register **37** and **Bn** and no fallback.

N1 **When originating or answering, start handshake only at the communication standard specified by S register 37 and Bn. During handshake, fallback to a lower speed may occur except in N1 mode. (default)**

On Return On-line to Data Mode

O0 Instructs the modem to exit on-line command mode and return to data mode (see AT Escape Sequence, +++).

O1 This command issues a retrain before returning to on-line data mode.

O3 This command issues a rate renegotiation before returning to on-line data mode.

P Enable Pulse Dialing

This command instructs the modem to use pulse dialing. Dialed digits will be pulsed dialed until a T command or dial modifier is received. Tone dial is the default setting.

Qn Results Code Display Option

This command controls whether the result codes are displayed to the DTE.

Q0 **Result codes enabled. (default)**

Q1 Result codes disabled.

T Enable Tone Dialing

This command instructs the modem to send DTMF tones while dialing. Dialed digits will be tone dialed until a P command or dial modifier is received. This is the default setting.

Vn Result Code Form

This command determines whether result codes (including call progress and negotiation progress messages) are displayed as numbers or words.

- V0** Numeric form. (0 for OK)
- V1** **Verbose form. (0 for OK)(default)**

Wn Select Extended Result Codes

This command determines which result codes will be used to describe the type of connection and protocol that resulted from handshaking and negotiation.

- W0** **CONNECT result code reports DTE speed. (default)**
- W1** CONNECT result code reports DTE speed; enable the CARRIER, COMPRESSION and PROTOCOL extended result code.
- W2** CONNECT result code reports DCE speed.

Xn Result Code Selection and Call Progress Monitoring

This command enables tone detection options used in the dialing proces. As these functions are chosen, the modem chip set's result codes are also affected. Therefore, this command is frequently used to control the modem chip set's responses. The primary function of this control is to control the modem chip set's call response capabilities.

	Ext. Result Code	Dial Tone Detect	Busy Tone Detect
X0	Disable	Disable	Disable
X1	Enable	Disable	Disable
X2	Enable	Enable	Disable
X3	Enable	Disable	Enable
X4	Enable	Enable	Enable(default)
X5	Enable	Enable	Enable
X6	Enable	Enable	Enable
X7	Disable	Enable	Enable

Yn Long Space Disconnect

Long space disconnect is always disabled.

- Y0** **Disable long space disconnect. (default)**
- Y1** Enable long space disconnect. NOT SUPPORTED.

Zn Recall Stored Profile

This command instructs the modem chip set to go on hook and restore the selected stored profile. Any nonstorable parameters previously set are returned to their factory settings.

- Z0** Reset and recall user profile 0.

Z1 **Reset and recall user profile 1. (default)**

2.2.a Commands Preceded by &

&Bn **V.32 Auto Retrain**

This modem always auto retrains.

&B0 Disable V.32 auto retrain - NOT SUPPORTED.

&B1 **Enable V.32 auto retrain. (default)**

&Cn **Data Carrier Detect Option (Async only)**

This command controls how the state of the DCD or RLSD (receive line signal detect) relates to the carrier from the remote modem. Always use **&C1** for Sync mode.

&C0 State of carrier from remote modem is ignored. RLSD circuit is always on.

&C1 **State of carrier from remote modem is tracked. RLSD circuit reflects the state of carrier. (default)**

&Dn **Data Terminal Ready Option**

This command interprets how the modem will respond to the state of the DTR signal and changes to the DTR signal. This is for **&M0** only.

&D0 DTR ignored.

&D1 Go to command mode on on-to-off DTR transition.

&D2 **Hang up and go to command mode on on-to-off DTR transition. Autoanswer is disabled if DTR is low. (default)**

&D3 Reset on on-to-off DTR transition.

&Fn **Load Factory Settings**

This command loads the configuration stored and programmed at the factory. This operation replaces all of the command options and the S-register settings in the active configuration with factory values.

Note: When this command is placed on the command line at the same time as another AT command, the function of the command is ignored. To load the factory settings, this command must be issued by itself.

&F0 Recall factory setting as active configuration.

&F5 Recall factory settings appropriate for ETC mode as active configuration. This command enables ETC operation. It is automatically set upon detection of the cellular phone, enable by the)Cn command. The following options are set with &F5:

Function	MTC Implementation
LAPM only error correction	\N4
Maximum block size=64	
Modulation=V.32bis	S28=0
Transmit Level fixed per cell phone	S92
Wait for Carrier=90 sec	S7=90

CD loss delay=10 sec	S10=100
Auto FF/FB enabled	N/A
Startup at 9600	S40=2
Selects V.22 when applicable	B1

&Gn Guard Tone Option

This command determines which guard tone, if any, to transmit while transmitting in the high band (answer mode). This command is only used in V.22 and V.22bis mode.

&G0	No guard tones. (default)
&G1	550 Hz guard tone.
&G2	1800 Hz guard tone.

&Jn Auxiliary Relay Option

&J0	The auxiliary relay is never closed.
&J1	NOT SUPPORTED, responds ERROR.

&Kn Select Flow Control

This command selects the flow control method the modem chip set provides to the DTE to prevent the modem's buffer from overflowing with data. A data buffer holds the data until the modem is ready to transmit it. When the data buffer is full, flow control instructs the DTE to stop sending to the modem while the modem continues to send characters.

&K0	Disable flow control.
&K1	Reserved.
&K2	Reserved.
&K3	Enable bi-directional hardware flow control (RTS/CTS). (default)
&K4	Enable bi-directional XON/XOFF flow control.
&K5	Error.

&Mn Asynchronous Communications Mode

&M0	Asynchronous Mode. (default)
&M1	Reserved.
&M2	Reserved.
&M3	Reserved.
&M4	Reserved.

&Pn Pulse Dial Make-to-Break Ratio Selection

This command is effective only for Japan.

&P0	33/66 make/break ratio. (default)
----------------	--

&P1 17/33 make/break ratio (20 pps).

&Qn Asynchronous Communications Mode

&Q0 Asynchronous Mode, buffered. **Same as \N0.**

&Q1 Reserved.

&Q2 Reserved.

&Q3 Reserved.

&Q4 Reserved.

&Q5 **Error Control Mode, buffered. Same as \N3. (default)**

&Q6 Asynchronous Mode, buffered. **Same as \N0.**

&Q7 Reserved.

&Q8 MNP error control mode. If an MNP error control protocol is not established, the modem will fallback according to the current user setting in S36.

&Q9 V.42 or MNP error control mode. If neither error control protocol is established, the modem will fallback according to the current user setting in S36.

&Sn Data Set Ready Option

This command controls the functions of DSR. DSR indicates when the modem is connected to a communications channel and is ready. Async mode only. If the modem is in Sync mode, DSR is on during handshake and on-line, off in test or idle mode.

&S0 **DSR circuit always on. (default)**

&S1 DSR circuit on during handshaking and on-line, off in test modes or in idle mode.

Result Codes:

OK n=0, 1

&Tn Self-Test Commands

This command allows the user to perform diagnostic tests on the modem. These tests can help to isolate problems when experiencing periodic data loss or random errors.

&T0 Abort. Stops any test in progress.

&T1 Local analog loop. This test verifies modem operation, as well as the connection between the modem and computer. Any data entered at the local DTE is modulated, then demodulated, and returned to the local DTE. To work properly, the modem must be off-line.

&T3 Local digital loopback test.

&T6 Remote digital loopback test. This test can verify the integrity of the local modem, the communications link, and the remote modem. Any data entered at the local DTE is sent to, and returned from, the remote modem. To work properly, the modems must be on-line with error control disabled.

&Vn View Active Configuration and Stored Profile

This command is used to display the active profiles.

&V0 View active file.

&Wn Store Current Configuration

This command stores certain command options and S-register values into the modem's nonvolatile memory. The ATZ command or a power-up reset of the modem restores this profile.

Result Codes:
OK n=0

&Yn Select Stored Profile for Hard Reset

This command does not change the behavior of the modem but is included for compatibility with applications that issue the &Y0 command.

&Y0 Select stored profile 0 on power-on.
&Y1 ERROR.

&Zn=x Store telephone Number

This command is used to store up to four dialing strings in the modem's nonvolatile memory for later dialing. The format for the command is &Zn="stored number" where n is the location 0-3 to which the number should be written. The dial string may contain up to 40 characters. the ATDS=n command dials using the string stored in location n.

Result Codes:
OK n=0, 1, 2, 3
ERROR Otherwise

**2.2b Commands Preceded by **

\Gn Modem Port Flow Control

\G0 Returns an "OK" for compatibility. (default)
\G1 NOT SUPPORTED, responds ERROR.

\Jn Adjust Bits/s/ Rate Control

When this feature is enabled, the modem emulates the behavior of modems that force the DTE interface to the line speed.

\J0 Turn off feature. (default)
\J1 Turn on feature.

\Kn Set Break Control

This command determines how the modem processes a Break signal received from the local DTE during a connection (online).

\K0	Reserved, returns ERROR.
\K1	Reserved, returns ERROR.
\K2	Reserved, returns ERROR.
\K3	Reserved, returns ERROR.
\K4	Reserved, returns ERROR.
\K5	Modem sends the break to the remote modem in sequence with transmitted data, non-destructive/non-expedited. (default)

\Nn Error Control Mode Selection

This command determines the type of error control used by the modem when sending or receiving data.

\N0	Buffer mode. No error control (same as &Q6).
\N1	Direct mode.
\N2	MNP or disconnect mode. The modem attempts to connect using MNP 2-4 error control procedures. If this fails, the modem disconnects. this is also known as MNP reliable mode.
\N3	V.42, MNP, or buffer. The modem attempts to connect in V.42 error control mode. If this fails, the modem attempts to connect in MNP mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/MNP reliable mode (same as &Q5). (default) auto
\N4	V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the call will be disconnected.
\N5	V.42 MNP or buffer (same as \N3).
\N7	V.42 MNP or buffer (same as \N3).

\Qn Local Flow Control Selection

\Q0	Disable flow control. Same as &K0.
\Q1	XON/XOFF software flow control. Same as &K4.
\Q2	CTS-only flow control. This is not supported and the response is ERROR.
\Q3	RTS/CTS to DTE (same as &K3). (default)

\Tn Inactivity Timer

This command specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. A setting of zero disables the timer. Alternatively, this timer may be specified in register S30. This function is only applicable to buffer mode.

Result Codes:
OK n=0-255

ERROR Otherwise

\Vn Protocol Result Code

\V0 Disable protocol result code appended to DCE speed.

\V1 Enable protocol result code appended to DCE speed. (default)

\Xn XON/XOFF Pass Through

\X0 Modem processes XON/XOFF flow control characters locally. (default)

\X1 NOT SUPPORTED, responds ERROR.

2.2.c Commands Preceded by %

%B View Numbers in Blacklist

If blacklisting is in effect, this command displays the numbers for which the last call attempted in the past two hours failed. The ERROR result code appears in countries that do not require blacklisting.

%Cn Data Compression Control

This command determines the operation of V.42bis and *MNP* class 5 data compression. On-line changes do not take effect until a disconnect occurs first.

%C0 V.42bis/*MNP* 5 disabled. No data compression.

%C1 V.42bis/*MNP* 5 enabled. Data compression enabled. (default)

2.2.d Commands Preceded by -

-Cn Data Calling Tone

Data Calling Tone is a tone of certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of 0.5 s on and 2 s off.

-C0 Disabled. (default)

-C1 Enabled.

2.2.e AT Commands Reference

+ES=6 Enable Synchronous Buffered Mode

The synchronous buffered data mode allows an H.324 video application direct access to the synchronous data channel. On underflow, the modem sends HDLC flag idle (0x7E) to the remote modem. This special error control mode is overridden by any of the following commands: &F, &M, &Q, and \N.

Result Codes:

OK	+ES=6
+ES:6	+ES? or +ES=? shpws the only allowed value.
ERROR	Otherwise

2.2.f AT Commands for Testing and Debugging

The following commands are to be used for testing and debugging only and are not meant for general use.

&&C Write to/Read from Host Interface

AT&&C<loc>, <val> writes the value <val> to host interface at location <loc>.

AT&&C<loc> reads from location <loc>.

&&L Line-to-Line Loopback

This command provides a loopback for line-to-line.

&&R Write to/Read from DSP RAM Location

AT&&R<loc>, <val> writes the value <val> to DSP RAM at location <loc>.

AT&&R<loc> reads from location <loc>.

&&S Speaker Codec Loopback(This command has no effect on PCMCIA)

This command provides a loopback from the microphone to the speaker.

2.3 Commands Not Preceded by AT

Two commands, **A/** and **+++**, are neither preceded by the attention code **AT** nor followed by a carriage return.

A/ Repeat Command

A/ repeats the execution of the last command line stored in the command buffer. If the last command line is invalid, the ERROR result code will appear on the screen. Note that **A/** cannot be preceded by **AT**; if it is, ERROR will appear on the screen.

+++ Escape

+++ followed by **AT<CR>** returns to the on-line command state (command state without breaking the established connection) from the on-line state.

To escape, stop transmitting data, wait at least one escape guard time (the default time is one second), and then enter three consecutive escape characters (the default character is +) followed by **AT<CR>**. After one more escape guard time (one second), the modem returns to the command state and sends the **OK** result code to the screen. Note that the escape command is the only command that can be recognized by the modem in the on-line state; it cannot be recognized in the command state.

2.4 Results Code

The modem sends a response to the user via the screen after a command is issued. As shown in the figure below, there are two forms for each result code: verbose code and digital code.

Numeric	Verbose	Description
0	OK	Command executed.
1	CONNECT	Connection at any speed if X0 selected; otherwise, connection at 0-300bits/s.
2	RING	Ring signal detected.
3	NO CARRIER	Carrier signal not detected or lost.
4	ERROR	Invalid command, checksum, error in command line, or command line too long.
5	CONNECT 1200	Connection at 1200bits/s. Disabled by X0.
6	NO DIALTONE	No dial tone detected. Enabled by X2, X4, or W dial modifier.
7	BUSY	Busy detected. Enabled by X3 or X4.
8	NO ANSWER	No silence detected when dialing a system not providing a dial tone. Enabled by @ dial modifier.
10	CONNECT 2400	Connection at 2400 bits/s.
11	CONNECT 4800	Connection at 4800 bits/s.
12	CONNECT 9600	Connection at 9600 bits/s.
13	CONNECT 14400	Connection at 14400 bits/s.
14	CONNECT 19200	Connection at 19200 bits/s. Enabled by W0.
15	CONNECT 16800	Connection at 16800 bits/s.
18	CONNECT 57600	Connection at 57600 bits/s. Enabled by W0.
24	CONNECT 7200	Connection at 7200 bits/s.
25	CONNECT 12000	Connection at 12000 bits/s.
26	CONNECT 1200/75	Connection at 1200 bits/s/75 bits/s(V.23).
27	CONNECT 75/1200	Connection at 75 bits/s/1200 bits/s(V.23).
28	CONNECT 38400	Connection at 38400 bits/s.
29	CONNECT 21600	Connection at 21600 bits/s.
30	CONNECT 24000	Connection at 24000 bits/s.
31	CONNECT 26400	Connection at 26400 bits/s.
32	CONNECT 28800	Connection at 28800 bits/s.
33	CONNECT 115200	Connection at 115200 bits/s.
34	CONNECT 31200	Connection at 31200 bits/s.
35	CONNECT 33600	Connection at 33600 bits/s.
40	CARRIER 300	Carrier detected at 300 bits/s.
42	CARRIER 75/1200	Carrier detected at 75 bits/s/1200 bits/s.
43	CARRIER 1200/75	Carrier detected at 1200 bits/s/75 bits/s.
46	CARRIER 1200	Carrier detected at 1200 bits/s.
47	CARRIER 2400	Carrier detected at 2400 bits/s.
48	CARRIER 4800	Carrier detected at 4800 bits/s.
49	CARRIER 7200	Carrier detected at 7200 bits/s.
50	CARRIER 9600	Carrier detected at 9600 bits/s.
51	CARRIER 12000	Carrier detected at 12000 bits/s.
52	CARRIER 14400	Carrier detected at 14400 bits/s.
53	CARRIER 16800	Carrier detected at 16800 bits/s.
54	CARRIER 19200	Carrier detected at 19200 bits/s.
55	CARRIER 21600	Carrier detected at 21600 bits/s.
56	CARRIER 24000	Carrier detected at 24000 bits/s.
57	CARRIER 26400	Carrier detected at 26400 bits/s.
58	CARRIER 2880	Carrier detected at 28800 bits/s.
59	CARRIER 31200	Carrier detected at 31200 bits/s.
60	CARRIER 33600	Carrier detected at 33600 bits/s.
66	COMPRESSION: MNP 5	MNP compression negotiated.
67	COMPRESSION: V.42BIS	V.42bis compression negotiated.
69	COMPRESSION:	No compression negotiated.

	NONE	
70	PROTOCOL: NONE	Asynchronous mode.
77	PROTOCOL: LAPM	V.42 LAPM.
80	PROTOCOL: MNP	MNP negotiated.
81	PROTOCOL: MNP 2	MNP Class 2 negotiated.
82	PROTOCOL: MNP 3	MNP Class 3 negotiated.
83	PROTOCOL: MNP 2, 4	MNP Class 2 and 4 negotiated.
84	PROTOCOL: MNP 3, 4	MNP Class 3 and 4 negotiated.
85	CARRIER 29333	Carrier detected at 29333 bits/s.(V.90)
86	CARRIER 30666	Carrier detected at 30666 bits/s.(V.90)
87	CARRIER 32000	Carrier detected at 32000 bits/s.(K56 flex or V.90)
88	CARRIER 33333	Carrier detected at 33333 bits/s.(V.90)
89	CARRIER 34000	Carrier detected at 34000 bits/s.(K56 flex)
90	CARRIER 34666	Carrier detected at 34666 bits/s.(V.90)
91	CARRIER 36000	Carrier detected at 36000 bits/s.(K56 flex or V.90)
92	CARRIER 37333	Carrier detected at 37333 bits/s.(V.90)
93	CARRIER 38000	Carrier detected at 38000 bits/s.(K56 flex)
94	CARRIER 38666	Carrier detected at 38666 bits/s.(V.90)
95	CARRIER 40000	Carrier detected at 40000 bits/s.(K56 flex or V.90)
96	CARRIER 41333	Carrier detected at 41333 bits/s.(V.90)
97	CARRIER 42666	Carrier detected at 42666 bits/s.(V.90)
98	CARRIER 44000	Carrier detected at 44000 bits/s.(K56 flex or V.90)
99	CARRIER 45333	Carrier detected at 45333 bits/s.(V.90)
100	CARRIER 46000	Carrier detected at 46000 bits/s.(K56 flex)
101	CARRIER 46666	Carrier detected at 46666 bits/s.(V.90)
102	CARRIER 48000	Carrier detected at 48000 bits/s.(K56 flex or V.90)
103	CARRIER 50000	Carrier detected at 50000 bits/s.(K56 flex)
104	CARRIER 50666	Carrier detected at 50666 bits/s.(V.90)
105	CARRIER 52000	Carrier detected at 52000 bits/s.(K56 flex or V.90)
106	CARRIER 53333	Carrier detected at 53333 bits/s.(V.90)
107	CARRIER 54000	Carrier detected at 54000 bits/s.(K56 flex)
108	CARRIER 54666	Carrier detected at 54666 bits/s.(V.90)
109	CARRIER 56000	Carrier detected at 56000 bits/s.(K56 flex or V.90)

3 - S REGISTER REFERENCE

Your modem has status registers. These registers are memory locations inside your modem which control your modem's operation. You usually do not have to worry about setting any register because the default values work for most applications.

The S registers are summarized in Fig. 3-1, along with their default values. Registers denoted with an "*" may be stored in one of the two user profiles by entering the **&Wn** command. One of these profiles may be loaded at any time by using the **Zn** command.

The factory default values are stored in ROM and are loaded into the active configuration at power-up or by the **Zn** command. In addition, the designated default profile is subsequently loaded, and may change some of the factory default values. The designated default profile can be changed by entering the **&Yn** command, where 'n' is one of the two possible user profiles. The factory defaults can be loaded at any time by entering the **&F** command.

3.1 S Registers Summary

The following chart summarizes your modem's registers:

Reg.#	Range	Unit	Default		Description
			Dec	Hex	
S0	0-255	rings	0	00h	Number of Rings Before Auto-answer
S1	0-255	rings	0	00h	Ring Count
S2	0-255	ASCII	43	2Bh	Escape Character Code
S3	0-127	ASCII	13	0Dh	Command Terminator (<CR> Character)
S4	0-127	ASCII	10	0Ah	Line Feed Character
S5	0-255	ASCII	8	08h	Back Space Character
S6	2-65	seconds	2	02h	Wait Time for Dialing
S7	1-255	seconds	50*	32h	Wait for Carrier after Dial
S8	0-65	seconds	2*	02h	Pause Time for Comma (Dial Delay)
S10	1-254	1/10 sec.	20*	14h	Lost Carrier to Hang-up Delay
S11	50-150	1/1000 sec.	95	5Fh	DTMF Tone Duration
S12	0-255	1/50 sec.	50	32h	Escape Guard Timing
S28	0-255		1*	01h	V.34 Modulation Enable/Disable
S30	0-255	minutes	0*	00h	Inactivity Timer
S35	0-1		0*	00h	Data Calling Tone
S36	0-7		7	07h	Negotiation Fallback
S37	0-19		0	00h	Dial Line Rate
S38	0-22		1	01h	56K Downstream Rate Selection for K56 flex/V.90 Mode
S40	0-2		0	00h	ETC Startup Autorating
S42	0-1		1	01h	Auto Rate
S43	0-1		1	01h	Auto Mode
S48	7, 128		7	07h	LAPM Error Control and Feature Negotiation
S89	0, 5-255		10	0Ah	Timer to Control Sleep Mode
S90	0-1		0	00h	Local Phone Status
S91	6-15	1dB	15	0Fh	Line Transmit Level
S92			20	14h	Direct Connect Transmit Level
S109	0-2		1	01h	K56 flex/V.90 Automode Selection

Fig. 3-1 S-Register Summary

3.2 S Registers

S0 Number of Rings Before Auto Answer

S0 determines the number of rings that must be received before the modem automatically answers an incoming call. For example, when **S0=3**, the modem automatically answers after the third ring. When **S0=0**, the modem does not automatically answer an incoming call; it stays on-hook until the **A** command is issued manually to answer the incoming call.

Range: 0-255 rings
Default: 0

S1 Ring Count

S1 automatically increments its value by one each time the modem receives a ring while in the command state. **S1** is reset to zero if no ring is detected within 8 seconds.

Range: 0-255 rings
Default: 0

S2 ASCII Value of Escape Character

S2 stores the ASCII value of the escape character. Setting register **S2** to a value greater than 127 disables the escape command and you cannot return to the command state. With escape disabled, in the on-line state the modem cannot hang up until the power is turned off or the remote modem hangs up.

Range: 0-255, ASCII decimal
Default: 43(+)

S3 ASCII Value of Carriage Return

S3 stores the ASCII value of the carriage return character. (Pertains to asynchronous operation only.)

Range: 0-127, ASCII decimal
Default: 13

S4 ASCII Value of Line Feed Character

S4 stores the ASCII value of the line feed character, if your computer does not recognize the default as a line feed, change the value. A value greater than 127 disables the line feed. When disabled, the line feed character that precedes or follows a result code is canceled. (Pertains to asynchronous operation only.)

Range: 0-127, ASCII decimal
Default: 10(Line Feed)

S5 Back Space<BS> Character (user defined)

Sets the character recognized as a backspace. Pertains to Asynchronous operation only. The modem will not recognize the backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo commands is enabled, the modem echoes back to the local DTE the backspace character, an ASCII space character, and a second backspace character, this means a total of three characters are transmitted each time the modem processes the backspace character.

Range: 0-127, ASCII decimal
Default: 008(backspace)

S6 Wait Time for Dialing

S6 controls how long the modem waits after it goes off-hook before it dials the first digit of the telephone number. The modem always pauses for at least 2 seconds, even if **S6** is set to less than two seconds. If option **X2**, or **X4** is in effect, this option is ignored.

Range: 2-65 seconds
Default: 2

S7 Wait for Carrier after Dial

S7 controls how long the modem waits for a carrier signal from a remote modem after originating a call or from the calling modem after going off-hook when answering a call.

S7 also controls how long the modem waits for a one-second continuous dialtone after dialing a number followed by the **W** dial modifier. If the modem detects a one-second continuous dialtone within the specified wait time, it proceeds to dial.

Range: 1-255 seconds
Default: 50

S8 Pause Time for Comma

S8 controls how long the modem pauses when a comma "," is encountered in a dial string while executing a dial command.

Range: 0-65 seconds
Default: 2

S10 Delay between Loss of Carrier and Hang-Up

S10 determines the delay time between the loss of a carrier from the remote modem and hang-up. This allows for a temporary loss of carrier without causing the local modem to disconnect. When **S10** is set to 255, the modem functions as if a carrier is always present.

The actual interval the modem waits before disconnecting is the value in **S10**.

Range: 1-254 tenths of a second
Default: 20(2 seconds)

S11 DTMF(Touch-tone) Tone Duration

S11 determines the duration and spacing of tones for Dual Tone Multifrequency (DTMF) dialing. This value has no effect on pulse dialing.

Range: 50-150 milliseconds
Default: 95

S12 Escape Guard Time

S12 determines the escape guard time. The escape guard time is the minimum waiting time required before and after entering the escape code (three consecutive escape characters) in the on-line state. It is also the maximum waiting time allowed between any two consecutive escape characters. If the waiting time before or after the escape code is shorter than the guard time, or if the waiting time between consecutive escape characters is longer than the guard time, then the modem does not recognize the escape command and stays on-line.

If the escape guard time is set at 0 seconds, it is impossible to return the modem to command state.

Range: 0-255 1/50 of a second
Default: 50

S28 V.34 modulation Enable/Disable

This register enables/disables V.34 modulation. 0=disabled, 1-255=enabled.

Range: 0-255
Default: 1

S30 Inactivity Timer

S30 specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. This function is only applicable to buffer mode.

Range: 0-255 (minutes)
Default: 0

S35 Data Calling Tone

Data Calling Tone is a tone of certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of 0.5 s on and 2 s off. 0=disabled, 1=enabled.

Range: 0-1
Default: 0

S36 Negotiation Fallback

This register specifies the action to take in the event of negotiation failure when error control is selected.

S36=0, 2 Hang Up.
S36=1, 3 Fallback to an asynchronous connection.
S36=4, 6 Attempt *MNP*. If *MNP* fails, hang up.
S36=5, 7 Attempt *MNP*. If *MNP* fails, fallback to asynchronous connection.
Default: 7

S37 Dial Line Rate

S37=0 Maximum modem speed.
S37=1 Reserved.
S37=2 1200/75 bits/s.
S37=3 300 bits/s.
S37=4 Reserved.
S37=5 1200 bits/s.
S37=6 2400 bits/s.
S37=7 4800 bits/s.
S37=8 7200 bits/s.
S37=9 9600 bits/s.
S37=10 12000 bits/s.
S37=11 14400 bits/s.
S37=12 16800 bits/s.
S37=13 19200 bits/s.
S37=14 21600 bits/s.

S37=15	24000 bits/s.
S37=16	26400 bits/s.
S37=17	28800 bits/s.
S37=18	31200 bits/s.
S37=19	33600 bits/s.

Default: 0

S38 56K Downstream Rate Selection for K56 flex/V.90 Mode (default 1)

There are at S109=1 K56 flex/V.90 common operation or S109=2 V.90 only K56 flex disable.

S38=0	V.90 or K56 flex disable
S38=1	V.90 or K56 flex autorate
S38=2	29333bit/s
S38=3	30666bit/s
S38=4	32000bit/s
S38=5	33333bit/s
S38=6	34666bit/s
S38=7	36000bit/s
S38=8	37333bit/s
S38=9	38666bit/s
S38=10	40000bit/s
S38=11	41333bit/s
S38=12	42666bit/s
S38=13	44000bit/s
S38=14	45333bit/s
S38=15	46666bit/s
S38=16	48000bit/s
S38=17	49333bit/s
S38=18	50666bit/s
S38=19	52000bit/s
S38=20	53333bit/s
S38=21	54666bit/s
S38=22	56000bit/s

Default: 1

S40 ETC Startup Autorating

S40=0	Startup with normal autorating.
S40=1	Startup at initial rate of 4800 or below.
S40=2	Startup at initial rate of 9600 or below.

Range: 0-2

Default: 0

S42 Auto Rate

This command is used for testing and debugging only.

V.32bis and V.22bis auto rate is disabled. Retrain operation is disabled or enabled in data mode, and fallback is disabled in data mode. 0=auto rate disabled, 1=enabled.

Range: 0-1
Default: 1

S43 Auto Mode

This command is used for testing and debugging only. V.32bis startup auto mode operation disabled.
0=auto mode disabled, 1=enabled.

Range: 0-1
Default: 1

S48 LAPM Error Control and Feature Negotiation

S48=7 Negotiation enabled.
S48=128 Negotiation disabled; forces immediate fallback options specified in S36.

The following chart lists the **S36** and **S48** configuration settings necessary to negotiate certain types of connections.

	S48=7	S48=128
S36=0, 2	LAPM or hangup	do not use
S36=1, 3	LAPM or async	async
S36=4, 6	LAPM, MNP, or hangup	MNP or hangup
S36=5, 7	LAPM, MNP, or async	MNP or async

S89 Timer to Control Sleep Mode

This command displays the number of seconds of inactivity (no characters sent from the DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode.

Note: If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 seconds. This is done for compatibility with previous products which allowed time-outs down to 1 s.

Range: 0, 5-255
Default: 10

S90 Local Phone Status

This register tells the status of the Local Phone. It is read only.

0=local phone on-hook.
1=local phone off-hook.

S91 Line Transmit Level

This register is effective only for Japan. It specifies the line transmit level in dB with an implied minus sign.

Range: 6-15 (dB)
Default: 15

S92 Direct Connect Transmit Level

Sets the transmit level, in dBm for direct connect. This value may have different settings for different phones.

Default: 20

S109 K56 flex/V.90 Automode Selection

S109=0 V.PCM disable.
S109=1 K56 flex or V.90.
S109=2 V.90 only.

Default: 1

4 - TROUBLESHOOTING GUIDE

This chapter describes common problems in the installation, configuration and regular usage of your Fax/Data Modem. To test the Fax/Data Modem, a communication software package is needed and the package must include a mode that allows you to operate your Fax/Data Modem by directly issuing internal commands to the modem.

Follow the procedures in the following sections to resolve these common problems:

No Response From Your Modem

1. If you are using the internal add-on card modems, make sure that the COM port address you have set your modem to corresponds to the appropriate selection in the communications software which you are using.
2. Issue the **ATZ** command to reset your modem. The returned result code should be "0" or "OK" depending on what communications program you are using. Your modem is OK if you get one of these responses. If there is no response after issuing the **ATZ<CR>**, continue to the next step.
3. Check if there are any other interface cards in your computer that use the same COM port address as your modem. If so, you must set your modem to another COM port address. (Keep in mind that on most systems, only two COM ports are available. One of them must be used as either 1 or 3, while the other must be used as 2 or 4.) For example, if a mouse is set to COM1, your modem should be set to COM2 or COM4. Continue to the next step if the COM port address is OK.
4. Issue the command: **AT&F&W <CR>**, if a "0" or "OK" result code is displayed on the screen, your modem is OK. Otherwise, contact your dealer for assistance.

Your Modem Does Not Dial Out

Make sure that your modem responds normally. If you can communicate through the keyboard, check whether the modem is properly connected to the phone line.

Your Modem Does Not Connect After It Has Dialed a Phone Number

The problem may have several causes. The phone line may be too noisy or the telephone cord may be poor. Try the line with a regular phone. Also the remote modem may not recognize your modem's baud rate.

You Can't Transmit After You Have Connected to the Remote Modem

In this case, check the communication parameters of the remote modem, then configure your software to the same number of data bits, stop bit, and parity.

5 - APPLICATIONS EXAMPLE

5.1 Dialing a Remote Modem

Command line: **ATDP9WT002, (886)-7128423<CR>**

This command line instruct the modem to dial a remote modem through a PBX. The modem first use pulse dialing to dial 9 (the access code of the PBX), wait for outside dial tone, and then use touch tone dialing to dial 002 once a one-second continuous dial tone is detected within 30 seconds, pause for 2 seconds (if S8=2) and then dial 8867128423.

5.2 Dial a Stored Number

Command line: **AT&Z2=T03,709394<CR>**

Command line: **ATDS=2<CR>**

The first command line store the dial string T03, 709394 to the 3rd location in NVRAM. Afterwards you can use the second command line to dial this stored number. The dial string T03, 709394 will appear on the screen to indicate the number being dialed.

5.3 Manual Answer an Incoming Call

Command line: **ATA<CR>**

The factory setting of the S-register S0 is S0=0. This condition disables the auto answer capability so that you must issue an ATA command to answer a call. At power up, your modem always monitors if there are incoming rings. If incoming rings are detected, your modem will display result codes on the screen as :

RING
:
:
:
RING

Seeing that, you may issue the ATA command to answer the call. This command must be entered within the quiet interval between any two rings.

5.4 Auto Answer an Incoming Call

Command line: **AT S0=2 &W &Y<CR>**

Auto answer can be enabled by changing the setting of the S-register S0 to a value between 1 and 255. In the above command line, S0=2 instructs the modem to answer an incoming call automatically after the 2nd ring. The &W command writes this configuration to profile 0 in NVRAM. &Y command instruct the modem to load profile 0 as the active configuration on power-up. The last two commands make S0=2 the default value at power-up or reset.

This example also shows the insertion of space between two neighboring commands to make the command line more readable.

5.5 Voice to Data Switching

Command line: **ATA<CR>** or **ATX1D<CR>**

If you are talking with a remote modem user through the telephone set and want to initiate data communication with the remote modem, follow the procedure below:

1. You or the remote user issue an ATA command first to switch to data communication.
2. When the person on the other end hears an answer tone from the phone, issues an ATX1D command (X1 to disable the dial tone monitor) to instruct the modem to go off-hook and wait for a carrier. If connection is successful, the CONNECT XXXX result code will be displayed on the screen. Now you can hang up your phone and begin data communication with the remote modem.

A - TECHNICAL SPECIFICATIONS

Speeds

(bps) 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 19200, 21600, 24000, 26400, 28800 (plus 38400, 57600, 115.2K bps in data mode only)

Protocols

(Data) 56K Flex/V.90, ITU-T V.34, V.32 bis, V.32, V.22 bis, V.23, V.22, and V.21, Bell: 212A and 103, AT&T V.32 terbo

(Fax) ITU-T V.17, V.29, V.27 ter, and V.21 ch 2

Error Checking 100% reliable data transfer with V.42bis/MNP 5

Standards Enhanced 'AT' command set, Fax Class 1 commands

Operation Full- or Half-duplex 33600, 31200, 28800 bps with 264000, 24000, 21600, 19200, 14400, 9600, 4800, 2400 and 1200 bps auto fall-back

Test Modes Analog loopback, local digital loopback, and remote digital loopback

Modulation

Data	56000 bps	V.PCM
	33600 bps	TCM
	31200 bps	TCM
	28800 bps	TCM
	26400 bps	TCM
	24000 bps	TCM
	21600 bps	TCM
	19200 bps	TCM
	16800 bps	TCM
	14400 bps	TCM
	9600 bps	TCM
	7200 bps	TCM
	4800 bps	QAM
	2400 bps	QAM
	1200 bps	DPSK
	1200TX/75RX bps	FSK
	75TX/1200RX bps	FSK
	600 bps	DPSK
	300 bps	FSK
Fax	14400 bps	QAM
	9600 bps	QAM
	7200 bps	QAM
	4800 bps	DPSK
	2400 bps	DPSK

Audio Monitor Built-in speaker, with software-controllable volume control

Guard Tone 550/1800 Hz

Compatibility

Data	K56 Flex/V.90	56000/33600
	ITU-T V.34 ANNEX 12	33600/31200
	ITU-T V.34	28800/26400/24000/21600/19200/16800/14400
	V.32 Terbo	19200/16800
	ITU-T V.32bis	14400/9600 bps, asynchronous, synchronous
	ITU-T V.32	9600/4800 bps, asynchronous, synchronous
	ITU-T V.22bis	2400/1200 bps, asynchronous, synchronous
	ITU-T V.23	1200/75 bps, asynchronous, synchronous
	ITU-T V.22	1200 bps, asynchronous, synchronous
	ITU-T V.21	300 bps, asynchronous
	Bell 212A	1200 bps, asynchronous, synchronous
	Bell 103	300 bps, asynchronous
Fax	ITU-T V.17	14400/9600 bps, half-duplex
	ITU-T V.29	9600/7200 bps, half-duplex
	ITU-T V.27ter	4800/2400 bps, half-duplex
	ITU-T V.21 channel 2	300 bps, half-duplex
	G - III	(Group 3 fax)

Compliance FCC 15 & 68

Command Buffer 128 characters

Extra Memory 4 x 36 digits

Transmit Level -11±1dBm

Receive Sensitivity -40dBm

Pulse Dialing Specifications

	USA	International
Make/Break Ratio	39/61	33/67
Break Length	61ms	67ms
Dial Pulse Length	100m	100ms
Dial Pulse Rate	10pps	10pps
Interdigit Time	800ms	800ms

B - QUICK REFERENCE

A	Go On-line in Answer Mode
Bn	Communication Standard Setting
Cn	Carrier Control Option (dummy command)
Dn	Dial
En	AT Command Echo Options
Fn	On-Line Echo Command (dummy command)
Hn	Switchhook Control
In	Request ID Information
Ln	Speaker Volume
Mn	Speaker Control
Nn	Select Negotiate Handshake
On	Return On-Line to Data Mode
P	Enable Pulse Dialing
Qn	Results Code Display Option
T	Enable Tone Dialing
Vn	Result Code Form
Wn	Select Extended Result Codes
Xn	Result Code Selection and Call Progress Monitoring
Yn	Long Space Disconnect
Zn	Recall Stored Profile
&Bn	V.32 Auto Retrain

&Cn	Data Carrier Detect Option (Async only)
&Dn	Data Terminal Ready Option
&Fn	Load Factory Settings
&Gn	Guard Tone Option
&Jn	Auxiliary Relay Option
&Kn	Select Flow Control
&Mn	Asynchronous Communications Mode
&Pn	Pulse Dial Make-to-Break Ratio Selection
&Qn	Asynchronous Communications Mode
&Sn	Data Set Ready Option
&Tn	Self-Test Commands
&Vn	View Active Configuration and Stored Profile
&Wn	Store Current Configuration
&Yn	Select Stored Profile for Hard Reset
&Zn	Store Telephone Number
\Gn	Modem Port Flow Control
\Jn	Adjust Bits/s Rate Control
\Kn	Set Break Control
\Nn	Error Control Mode Selection
\Qn	Local Flow Control Selection
\Tn	Inactivity Timer
\Vn	Protocol Result Code
\Xn	XON/XOFF Pass Through
%B	View Numbers in Blacklist
%Cn	Data Compression Control
-Cn	Data Calling Tone
+ES=6	Enable Synchronous Buffered Mode

&&C	Write to/Read from Host Interface
&&L	Line-to-Line Loopback
&&R	Write to/Read from DSP RAM Location
&&S	Speaker Codec Loopback
@	Wait for Quiet Answer
,	Pause
!	Initiate a Hookflash
;	Return to Command State after Dialing
P	Pulse Dial
R	Reverse Dial Mode
S=n	Dial Stored Number
T	Tone DTMF Dial
W	Wait for Dial Tone
A/	Repeat Command
+++	Escape

C - HINTS FOR FAX SOFTWARE INSTALLATION

In order to make sure that your modem works properly with your PC in fax mode. Please add the modem command \Q1 to the initial string of the fax software.

D - GLOSSARY

ASCII - An acronym for American Standard Code for Information Exchange. ASCII is a seven-bit code which defines 128 standard characters, including control characters, letters, numbers, and symbols. An extra 128 characters comprise the extended ASCII set.

Baud Rate - The transmission rate between two serial devices, e.g., modems, fax machines, etc. Measured in Bits Per Second.

Blind Dialing - In blind dialing, the modem continues to dial, regardless of the existence of a dialtone, ring, or busy signal.

BPS - Bits Per Second; the number of bits that can be transmitted in one second.

Carrier Signal - The analog data signal that a modem sends over telephone wires.

COMx - Where (x = 1, 2, 3, or 4), COMx is the name(address) of serial communications ports on personal computers. Each serial port in a personal computer has a different number.

CTS - Clear To Send

Default - The assumed value that is used for a command parameter when no other value is explicitly provided.

DCD - Data Carrier Detect

DCE - Data Communication Equipment

DTE - Data Terminal Equipment

DTMF - Dual Tone Multifrequency(for touchtone dialing)

DTR - Data Terminal Ready

FSK - Frequency Shift Keying

Make/Break Ratio - The ratio of the off-hook (make) to on-hook (break) interval is the make/break ratio in pulse dialing.

Modem - A combination of the words MOdulator and DEModulator. Modems transform digital data into analog signals and back again.

Nonvolatile Memory - An area of memory inside the modem where the default configuration profile is stored. Values recorded in this memory will not be lost when the power is turned off.

Off-Hook - The condition when the modem has picked up the telephone line.

Off-Line Command State - A modem state in which the modem accepts, interprets and executes commands from an asynchronous computer or terminal.

On-Hook - The condition when the modem has not picked up the telephone line; the telephone is hung up.

On-Line - A carrier signal link with a remote modem has been established; communication is in progress.

On-Line State - A modem state in which the modem is connected with a remote modem. Data can be sent or received from the remote modem in this state. No commands will be accepted from the modem except the escape command which will bring the modem into the on-line command state.

On-Line Command State - A modem state in which the modem can accept or and execute commands from an asynchronous computer or terminal while remaining connected with the remote modem. The user can return the modem to the on-line state by issuing the **ATOn** command or put it into the off-line command state by issuing commands such as **ATZ** or **ATH**.

Parity - An error-checking method by which the modem verifies that the data just sent is correct.

pps - Pulse per second

Profile - A list of default settings.

Protocol - A technical specification for serial communications; the protocols supported by the modem are listed in Appendix B.

PSK - Phase Shift Keying

Pulse Dialing - A dialing form in which each digit is represented by a series of pulses. Rotary telephones all use pulse dialing.

QAM - Quadrature Amplitude Modulation

Result Codes - The response the modem returns to the screen upon executing a command.

RAM - Random Access Memory

ROM - Read-Only Memory. A chip inside the modem which stores the factory default settings. This memory cannot be changed.

RTS - Request To Send

RX - Reception

S Register - RAM locations in the modem which store the active configuration.

Serial Port - See COMx.

TCM - Trellis-Coded Modulation

Touchtone Dialing - A dialing format in which each digit is represented by a musical frequency.

TX - Transmission

E - ASCII CODE TABLE

Decimal	Hex	Value	Decimal	Hex	Value	Decimal	Hex	Value	Decimal	Hex	Value
000	00	NUL	032	20	(space)	064	40	@	096	60	'
001	01	SOH	033	21	!	065	41	A	097	61	a
002	02	STX	034	22	"	066	42	B	098	62	b
003	03	ETX	035	23	#	067	43	C	099	63	c
004	04	EOT	036	24	\$	068	44	D	100	64	d
005	05	ENQ	037	25	%	069	45	E	101	65	e
006	06	ACK	038	26	&	070	46	F	102	66	f
007	07	BEL	039	27	'	071	47	G	103	67	g
008	08	BS	040	28	(	072	48	H	104	68	h
009	09	HT	041	29	)	073	49	I	105	69	i
010	0A	LF	042	2A	*	074	4A	J	106	6A	j
011	0B	VT	043	2B	+	075	4B	K	107	6B	k
012	0C	FF	044	2C	,	076	4C	L	108	6C	l
013	0D	CR	045	2D	-	077	4D	M	109	6D	m
014	0E	SO	046	2E	.	078	4E	N	110	6E	n
015	0F	SI	047	2F	/	079	4F	O	111	6F	o
016	10	DLE	048	30	0	080	50	P	112	70	p
017	11	DC1	049	31	1	081	51	Q	113	71	q
018	12	DC2	050	32	2	082	52	R	114	72	r
019	13	DC3	051	33	3	083	53	S	115	73	s

020	14	DC4	052	34	4	084	54	T	116	74	t
021	15	NAK	053	35	5	085	55	U	117	75	u
022	16	SYN	054	36	6	086	56	V	118	76	v
023	17	ETB	055	37	7	087	57	W	119	77	w
024	18	CAN	056	38	8	088	58	X	120	78	x
025	19	EM	057	39	9	089	59	Y	121	79	y
026	1A	SUB	058	3A	:	090	5A	Z	122	7A	z
027	1B	ESC	059	3B	;	091	5B	[	123	7B	{
028	1C	FS	060	3C	<	092	5C	\	124	7C	|
029	1D	GS	061	3D	=	093	5D	]	125	7D	}
030	1E	RS	062	3E	>	094	5E	^	126	7E	~
031	1F	US	063	3F	?	095	5F	_	127	7F	DEL

